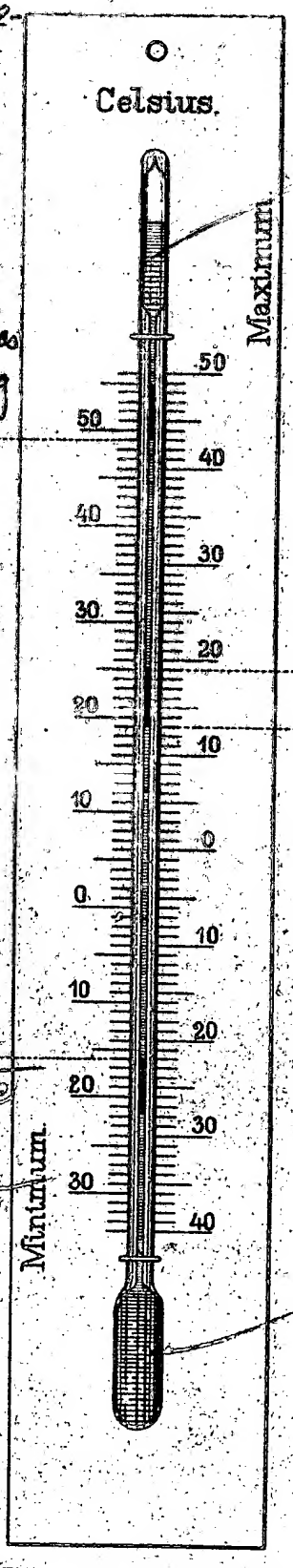
GB-04-1882

A.D. 1882. April 26. № 1967.
HADDAN'S SPECIFICATION.

(1 SHEET)

GERMAN DUPL. 21,082-



alcohol

indicators c + d are steel pins fused in a glass tube which has glass threads extending to walls of the main tube to hold indicator

c

a

b

Steel index d in glass + elastic glass threads. Reset by a magnet

alcohol

LONDON: Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE.
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Malby & Sons, Photo-Litho.

A.D. 1882, 26th APRIL. N° 1967.

Maximum and Minimum Thermometers.

LETTERS PATENT to Herbert John Haddan, of Kensington, Middlesex, for an invention of IMPROVEMENTS IN MAXIMUM AND MINIMUM THERMOMETERS. A communication from abroad by Heinrich Kappeller junior, of Vienna, Austria-Hungary.

PROVISIONAL SPECIFICATION left by the said Herbert John Haddan at the Office of the Commissioners of Patents on the 26th April 1882.

HERBERT JOHN HADDAN, of Kensington, Middlesex, "IMPROVEMENTS IN MAXIMUM AND MINIMUM THERMOMETERS," a communication from abroad by Heinrich Kappeller junior, of Vienna, Austria-Hungary,

This invention has for its object to construct maximum and minimum thermometers which are less liable to get out of order and can be read more easily than those generally used. For this purpose the thermometer consists of a vertical glass-tube with a bulb at the top and one at the bottom, said tube containing alcohol up to about the middle of the upper bulb. The continuity of the liquid in the tube is broken in or near the middle of the tube by a short column of mercury, above which there is a steel-pin fused into a small glass tube from which some glass threads extend to the walls of the maintube, so as to produce a slight elastic pressure against the same. Below the mercury column there is a second steel indicator similar to the upper one. If the liquid in the tube expands in consequence of a rise of temperature, the mercury rises thereby lifting the upper indicator, and when the mercury begins to fall the upper indicator remains in its highest position while the lower indicator moves downward until the minimum temperature is reached. The position of the two indicators shows the maximum and minimum temperature on two scales, one on the right and the other on the left of the glass tube.

[*Price* 6*d*.]

SPECIFICATION in pursuance of the conditions of the Letters Patent filed by the said Herbert John Haddan in the Great Seal Patent Office on the 17th October 1882.

HERBERT JOHN HADDAN, of Kensington, Middlesex, "IMPROVEMENTS IN MAXIMUM AND MINIMUM THERMOMETERS," a communication from abroad by Heinrich Kappeller junior, of Vienna, Austria-Hungary.

To determine the extremes of temperature, Rutherford's Instrument with two separate thermometers—a mercurial thermometer for the maximum and a Spirit thermometer for the minimum—as well as the handy six thermometers of Casell with U shaped tube, with double scale and filling of spirit and mercurial indicator have hitherto almost exclusively been used in Observatories. The disadvantages peculiar to this kind of thermometers are well known and it need only be pointed out that Rutherford's instruments very soon get out of order and that the Six thermometers are transportable with the greatest difficulties only, because, owing to the width of the tube, the mercury column which serves as an intermediate link is liable to break and to dissolve into small mercury particles which pass beyond the indicator whereby the instrument becomes entirely useless.

In the construction of the new instrument the disadvantages of the former constructions have been duly considered and the principal aim has been to produce as far as possible a simple and cheap instrument which is at the same time reliable and transportable. The new maximum and minimum thermometer consists, as seen in the accompanying drawing, of only one spirit thermometer having a straight tube with a wide bulb at the top. The tube is filled with alcohol so far as to fill half of the top bulb. At a convenient place of the capillary tube of the thermometer the continuity of the alcohol column is broken by a short thread of mercury $a-b$ (from 5 to 6 degrees long) which rises in consequence of the rise, and falls in consequence of the fall of the temperature, in other words, it serves as an Indicator of the existing temperature. Below the mercury column is a steel index d fused into a small glass tube slightly pressed to the wall of the capillary tube by means of elastic glass threads, above the mercury column there is a second similar index c. It is evident that both indices are moved by the mercury column according to the change which takes place in the temperature, *viz*, the upper index is pushed by the upper end of the mercury column a as long as the temperature is rising and it remains at the highest point arrived at as soon as the falling sets in, the opposite takes place with the second index which is pushed downwards towards the bulb end of the thermometer until the temperature ceases to fall. Two equally divided scales, both reading in the same direction and differing from each other by the length of the mercury column only serve to indicate the extremes of temperature. The scale on the right side indicates the maximum, the scale on the left the minimum. To replace the indices for further observations a magnet is used, by which both indices are again drawn near the mercury column. The most important part of the improvement consists principally in the extraordinary sensitiveness and in the graduations.

While the Six thermometers are provided with two scales one of which is divided in the natural direction, *viz* from below upwards, as generally found in thermometers, the other scale, is divided in the opposite direction *viz* from above downwards, which according to experience is often the cause of mistakes and thereby of useless observation.

CLAIMS.

1. A combined maximum and minimum thermometer consisting of a single tube, provided at the top and the bottom with a bulb and filled with alcohol in such a

manner that the alcohol fills about half of the upper bulb. When the temperature is normal and that the continuity of the Spirit column is broken by a small mercury column which according to the rise or fall in the temperature is shifted upwards or downwards, in combination with two steel indices fused into two small glass tubes and moveable in the tube of the thermometer indicating the maximum and minimum temperature arrived at by means of two equal scales arranged in the same direction, but differing from each other by the length of the mercury column.

2. The construction of a combined maximum and minimum thermometer in a single straight tube with an upper and lower bulb.

3. In a combined maximum and minimum thermometer the use of two moveable steel indices fused in small glass tubes, one of said steel indices being situated above and the other one below the mercury indicator which is placed about in the middle of the tube of the thermometer.

In Witness whereof I the said Herbert John Haddan have hereunto set my hand and seal this seventeenth day of October A.D. 1882.

H. J. HADDAN. (L.S.)

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1882.